

Proceeding

SCESCM 2016

Sustainable Civil Engineering Structures and
Construction Materials

Special Topics in Public Works Research and Technology

Bali, September 5-6 , 2016

Editors :

Dadang Karmen, Fitri Riandini, Suharyanto

Guest Editors :

Suprpto, Henricus Priyosulistyo, Ali Awaludin, Han Ay Lie

Publisher :



Department of Civil and Environmental Engineering
Gadjah Mada University
Yogyakarta

Conference Editors

EDITORS

Dadang Karmen, Indonesia

Fitri Riandini, Indonesia

Suharyanto, Indonesia

GUEST EDITORS

Han Ay Lie, Indonesia

Ali Awaludin, Indonesia

Henricus Priyosulistyo, Indonesia

Suprpto, Indonesia

Published by:

Department of Civil and Environmental Engineering

Gadjah Mada University, Yogyakarta, INDONESIA

Website: <http://tsipil.ugm.ac.id>

Tel: +62-274-545675

Fax: +62-274-545676

ISBN 978-602-71762-3-2



Copyright ©2016 by Department of Civil and Environmental Engineering, UGM

The texts of the papers in this volume were set individually by the authors or under their supervision. Only minor corrections to the text may have been carried out by the publisher. By submitting the paper in the 3rd International Conference on Sustainable Civil Engineering Structures and Construction Management, the authors agree that they are fully responsible to obtain all the written permission to reproduce figures, tables, and text from copyrighted material. The authors are also responsible to give sufficient credit included in the figures, legends, or tables. The organizer of the conference, reviewers of the papers, editors, and the publisher of the proceedings are not responsible for any copyright infringement and the damage they may cause.

Conference Organization

ORGANIZING INSTITUTIONS

Departement of Civil and Environmental Engineering
Faculty of Engineering
Gadjah Mada University, Indonesia

The Ministry of Public Works and Housing (PUPR)
Republic of Indonesia

Division of Engineering and Policy for Sustainable Environment
Faculty of Engineering
Hokkaido University, Japan

Institute of Concrete Structures and Building Materials (IMB) Faculty
of Civil Engineering, Geo, and Environmental Sciences Karlsruhe
Institute of Technology, Germany

SCIENTIFIC COMMITTEE

Han Ay Lie (Chair), Indonesia
Anita Firmanti, Indonesia
Suprpto, Indonesia
Andreas Triwiyono, Indonesia
Wawan Rusmana, Indonesia
Sugianto, Indonesia
Zaidir, Indonesia
Edy Anto Soentoro, Indonesia
Anton Soekiman, Indonesia
Syafi'I, Indonesia
Istiarto, Indonesia
Ery Suhartanto, Indonesia
Suharyanto, Indonesia
Barry Jones, United States
Masahiro Yoshimura, Japan
Salman Azhar, United States
Stephen Pessiki, United States
Benny Suryanto, United Kingdom
Adrian J. M. Leijten, The Netherlands
Anastasia Yunika, The Netherlands
K. van Breugel, The Netherlands
H. M. Jonkers, The Netherlands
B. H. W. Hadikusumo, Thailand
Djoen San Santoso, Thailand
Teerapong Senjuntichai, Thailand
Wen-Hsiang Hsieh, Taiwan
Abraham Christian, Singapore
Lado Riannevo Chandra, Singapore
Ong Khim Chye, Singapore
Tam Chat Tim, Singapore
Tor Arne Martius-Hammer, Norway
Buntara Sthenly Gan, Japan
Mitsuyasu Iwanami, Japan
Takashi Matsumoto, Japan
Tamon Ueda, Japan
Shunji Kanie, Japan
Ehsan Noroozinejad, Iran
Ade Lisantono, Indonesia
Agus Maryoto, Indonesia
Ali Awaludin, Indonesia
Aine Kusumawati, Indonesia
Aloysius Tjan, Indonesia
Djwantoro Hardjito, Indonesia
Ediansjah Zulkifli, Indonesia

Endah Wahyuni, Indonesia
Harijanto Setiawan, Indonesia
Henricus Priyosulistyo, Indonesia
Ilham Nurhuda, Indonesia
Ima Muljati, Indonesia
Iman Satyarno, Indonesia
Intan Supraba, Indonesia
Suripin, Indonesia
S. A. Kristiawan, Indonesia
Wong Foek Tjong, Indonesia
Senot Sangadji, Indonesia
Sholihin As'ad, Indonesia
Januarti Jaya Ekaputri, Indonesia
Jati Utomo Dwi Hatmoko, Indonesia
Jimmy Chandra, Indonesia
Johannes Adhijoso Tjondro, Indonesia
Made Sukrawa, Indonesia
Mochamad Teguh, Indonesia
M. Agung Wibowo, Indonesia
Patria Kusumaningrum, Indonesia
Prabowo Setiyawan, Indonesia
Pungky Pramesti, Indonesia
Purwanto Bakti Santoso, Indonesia
Sofia Mavridou, Greece
Frank Dehn, Germany
Franz-Hermann Schlueter, Germany
Harald S. Mueller, Germany
Petr Hájek, Czech Republic
Bagus Haryo Setiadji, Indonesia
Bambang Suhendro, Indonesia
Bambang Suryoatmono, Indonesia
Benjamin Lumantarna, Indonesia
Buan Anshari, Indonesia
Dina Rubiana Widarda, Indonesia
Robby Permata, Indonesia
Kefei Li, China
R. Sony Sulaksono W, Indonesia
Andi Arham Adam, Indonesia
Antoni, Indonesia
Antonius, Indonesia
Arya Thanaya, Indonesia
Anastasia Caroline Sutandi, Indonesia
Ary Setyawan, Indonesia

ORGANIZING COMMITTEE

Henricus Priyosulistyo, Indonesia (Chair)
Ali Awaludin, Indonesia (Vice)
Dadang Karmen, Indonesia
Wawan Rusmana, Indonesia
Hasan Basri, Indonesia
Arif Hidayat, Indonesia
Nynke Verhulst, The Netherlands
Arief Setiawan Budi Nugroho, Indonesia
Akhmad Aminullah, Indonesia
Inggar Septhia Irawati, Indonesia
Arya Thanaya, Indonesia
Suharyanto, Indonesia
Tatang Listyawan, Indonesia
Ade Lisantono, Indonesia
Luky Handoko, Indonesia
Eko Siswoyo, Indonesia
Prima J. Romadhona, Indonesia
Hariadi Yulianto, Indonesia
IGL Bagus Eratodi, Indonesia
S.A. Kristiawan, Indonesia
Antonius, Indonesia
Ima Muljati, Indonesia
Antoni, Indonesia
Harijanto Setiawan, Indonesia
Dina Rubiana Widarda, Indonesia
Paulus Kartawijaya, Indonesia

SUPPORTING INSTITUTIONS

UNDIP, Diponegoro University, Semarang
UNPAR, Parahyangan Catholic University, Bandung
UNS, Sebelas Maret University, Surakarta
UGM, Gadjah Mada University, Yogyakarta
UNSYIAH, Syiah Kuala University, Banda Aceh
UNAND, Andalas University, Padang
ITB, Institute Technology of Bandung, Bandung
UNIBRAW, Brawijaya University, Malang
UAJY, Atma Jaya University of Yogyakarta
UII, Islamic University of Indonesia, Yogyakarta
TU DELFT, Delft University of Technology, The Netherland
Lehigh University, United States
UNISSULA, Sultan Agung Islamic University, Semarang
Petra Christian University, Surabaya
Nihon University, Japan
TU/e, Eindhoven University of Technology, The Netherland

SUPPORTING ORGANIZATION

HAKI, Indonesian Society of Civil and Structural Engineering
ACF, Asian Concrete Federation
JSCE, Japan Society of Civil Engineers
FIB, International Federation for Structural Concrete
IABSE, International Association for Bridge and Structural Engineering

Preface

Dear participants and distinguished readers,

This International Conference on Sustainable Civil Engineering Structures and Construction Materials (SCESCM) is the 3rd in the series of a two-yearly event. The first and second conferences were conducted in Yogyakarta-Indonesia, and ever since this organization has grown, both in size, quality and performance. Initiated in 2012 by the Gadjah Mada University, the Karlsruhe Institute of Technology in Germany, and Hokkaido University in Japan, this organization is now supported by eleven major universities from Indonesia, The Netherlands and the United States. This 2016 conference has received over 400 papers originating from 27 countries. Professional organizations supporting the 3rd SCESCM are the Indonesian Society of Civil and Structural Engineers (HAKI), the Asian Concrete Federation (ACF), the Japan Society of Civil Engineers (JSCE), the International Federation for Structural Concrete (*fib*-CEB), and the International Association for Bridge and Structural Engineering (IABSE).

This 3rd SCESCM conference is also distinguished by the existence of a special session conducted in cooperation with the *Ministry of Public Works and Housing*, Indonesia. This special session is designated as *Special Topics in Public Works Research and Technology*. The Sustainability issue has been of major concern for the past decades, and its awareness became a primary subject and source for conservation and preservation of natural earth resources. The Ministry of Public Works and Housing is one of the largest ministries in Indonesia, and it fulfills a foremost role in the physical and intellectual development of the country. All key-constructions and infrastructures in Indonesia are accommodated, and fall under the responsibility of this ministry. A constant improvement in human resource quality by means of research and continuing education stands frontline for this ministry, enabling to keep up with the ever emerging fast global progress in technology.

Main concentrations for creating sustainable structures and systems are contemplated on the use of non – regeneration - able materials, while further attention has to be paid on material production and structural systems that generate hazardous waste, both directly or indirectly. The methodology behind the solution to these issues is a complex and ever emerging combination of variables, where research and technology stand central. This special session will host the research publications and research products of researchers, policy makers, educators and Department of Public Work and Housing Officials that were conducted over a period of two years. The majority of the publications are based on state-of-the-art development of structural systems and constructions of existing projects.

This event was made possible by the contributions and hard work of all supporting institutions and is hoped to that its outcome serves as a contribution to the future development in sustainable technology for constructions and structures.

Conference Chairman,

Prof. Ir. Henricus Priyosulistyo M.Sc, Ph.D.

Welcoming Speech

Dear Distinguish Guests, Guest Speakers, Ministry of Public Work and Housing Officials, Colleagues, Participants, Members of the supporting Universities, Committee Members, Ladies and Gentlemen,

Welcome to Bali, and welcome to this Special Topics in Public Works Research and Technology session that is conducted in cooperation with the 3rd International Conference on Sustainable Civil Engineering Structures and Construction Materials (SCESCM). This event will be held from today till the 6th of September 2016 at the Sanur Paradise Hotel in Bali, Indonesia.

This event marks a big milestone in the field of collaboration between the scientific community represented by the academic institutions, and the professional sector represented by among others the Indonesian Society of Civil and Structural Engineers (HAKI), the Asian Concrete Federation (ACF), the Japan Society of Civil Engineers (JSCE), the International Federation for Structural Concrete (*fib*-CEB), and the International Association for Bridge and Structural Engineering (IABSE), and foremost the government institutions hereby represented by the Department of Public Work and Housing Officials.

The participation of the Ministry of Public Works and Housing is of great importance, since this cooperation has major benefits for both parties. It is hoped that this conference will lead to a continuing long-time collaboration between the SCESCM and the Ministry of Public Works and Housing. The SCESCM has marked itself as one of the leading conferences in Indonesia, and the papers resulted from the past conferences were internationally recognized. The Ministry of Public Works and Housing on the other hand, has long been working together with academic institutions all over the country in improving the scientific quality and knowledge of its official through training and education. This merging through the conference resulted in a special session as part of the SCESCM 2016 conference.

It is hoped that the work, discussions, research disseminations and conclusions will be a valuable contribution to the civil engineering community generally, and the academic institutions and the Department of Public Works and Housing in particular.

I wish you a very pleasant stay in Bali while at the same time enjoying the conference and I thank to all supporting organizations and persons for their hard work to make this event a success and beneficial.

Thanks you very much.

Head of Education and Training Center
For Water Resources and Construction
The Ministry of Public Works and Housing

Dr. Ir. Suprpto, M.Eng

Table of Content

Cover Page	i
Conference Editors	ii
Conference Organization	iii
Preface	v
Welcoming Speech	vi
Table of Content	vii

Papers of Guest Speakers

1. “Sustainability of Human Society” Based Upon Materials and Energy Cycle Via Water Cycle <i>Masahiro Yoshimura</i>	1
2. Public Private Initiatives (PPI) facilitated through Integrated Project Delivery (IPD) for Maximizing Design and Construction Value <i>Barry Jones</i>	2

Papers

1. Post-Tsunami Coastal Structures Performances Around Meulaboh City, Indonesia <i>Aminullah Hidayat, Syamsidik, Masimin</i>	7
2. Application of Condition Index of Buildings (Case Study Sragen Technopark Building) <i>Agus Fitriyanto, S.A. Kristiawan, Syafi'i</i>	15
3. Damage Analysis for Coastal Protection Structure at Batu Berhanti Island (the Outer Islands) in Batam <i>Tommy Afrialdi, M. Cahyono, Fitri Riandini</i>	25
4. Causes of Termination of Contract in Construction Works in North Sumatera Province in Indonesia <i>Medy Juliana, Sarwono Hardjomuljadi, Anton Soekiman, Hasan Basri</i>	37
5. Bridge Maintenance Priority Based on Load Rating Factor Criteria: A Study Case <i>Tasman Hidayat, S.A. Kristiawan, Budi Yulianto</i>	46
6. The Leadership Assessment Study on the Level of Road Technical Personnel Competence at <i>Dinas Prasarana Jalan Tata Ruang dan Permukiman</i> Province of West Sumatera Using Requirement- Satisfaction Analysis <i>Welly Juwita, Yosritzal, Dedi Rinaldi</i>	58
7. Vehicle Over-loading Impacts Against Overlay Thickness and Remaining Life of Flexible Pavement (Case Study: National Road in West Sumatera) <i>Suriyatno, Purnawan, Elsa Eka Putri</i>	68
8. Study of Process of the Project Procurement for Road and Bridge Using E-Procurement Based on Presidential Regulation No. 04 Year 2015 <i>Moses Siburian, Anton Soekiman</i>	76
9. Spatial Optimization Model for Raw Water Supply Allocation (Case Study in Jabodetabek) <i>Edy Anto Soentoro</i>	85
10. Hydraulic Characteristics Analysis on Cipanas Dam Spillway <i>Galih H. Sundoro, Rahmat S. Lubis, Dian Sisinggih, Kirno, Asep Sulaeman</i>	95
11. Study of the Requirement and Availability of Water in Cultivation Areas Based on the Urban Planning of the Bener Meriah District 2012-2032 <i>Isma Arsyani, Alfiansyah Yulianur, Azmeri</i>	106
12. The Analysis of Channel Type Combination Alternative of “Klambu Kudu” Raw Water Channel <i>Heny Krisyani, Suseno Darsono, Pranoto Samto Atmojo</i>	119
13. Monitoring System of River Morphological Changes for Supporting River Structures Maintenance <i>Asep Sulaeman, Rahmat S. Lubis, Ery Suhartanto, Galih H. Sundoro</i>	125

14. Trade-off Analysis on Reservoir Operation for Flood-Control and Benefit from Raw Water and Hydropower (Case Study in Jatibarang Reservoir)	
<i>Ferdian Agung Nugroho, Edy Anto Soentoro</i>	134
15. Estimation of Road Network Performance of Surakarta City	
<i>Syafi'i, Slamet Jauhari Legowo, Fika Zusanti</i>	145